

WHAT IS CLAIMED IS:

- 1 1. In a communications configuration wherein a device receives a signal over
2 a communication channel while simultaneously transmitting a training signal
3 thereover, a method of enhancing performance of a receiver thereof, the method
4 comprising:
5 selecting a training subset of less than all signal elements based on those of the
6 signal elements employed in one or more recent data transmissions;
7 transmitting, during a training interval, substantially only the signal elements
8 of the training subset.
- 1 2. A method as in claim 1,
2 retrieving stored prior connection information to identify the employed signal
3 elements.
- 1 3. A method as in claim 1,
2 storing a encoding of employed signal elements for use in subsequent training
3 subset selections.
- 1 4. A method as in claim 1,
2 wherein the signal elements include tones in accordance with a discrete
3 multitone (DMT) modulation scheme.
- 1 5. A method as in claim 1,
2 wherein the device includes a digital subscriber line transceiver.
- 1 6. A method as in claim 5,
2 wherein the digital subscriber line transceiver is a central office end
3 transceiver.
- 1 7. A method as in claim 5,
2 wherein the digital subscriber line transceiver is a remote terminal end
3 transceiver.

1 8. A method as in claim 5,
2 wherein the communications configuration is an asymmetric digital subscriber
3 line configuration.

1 9. A method as in claim 1,
2 wherein the communications channel includes a digital subscriber loop.

1 10. A method as in claim 1,
2 wherein the training subset selection is performed as a function of plural sets
3 of prior connection information.

1 11. A method as in claim 1,
2 wherein the training subset selection is performed using a design function to
3 accommodate changing impairments of the communications channel.

1 12. A method as in claim 1,
2 wherein the receive signal includes a received training signal.

1 13. In a communications configuration wherein a device transmits a signal
2 over a communication channel, a method of reducing crosstalk into a second
3 communication channel, the method comprising:
4 selecting a training subset of less than all signal elements based on those of the
5 signal elements employed in one or more recent data transmissions;
6 transmitting, during a training interval, substantially only the signal elements
7 of the training subset.

1 14. A method as in claim 13, wherein signaling for the first and second
2 communications channel is at least partially conveyed by proximate wire pairs.

1 15. In a bi-directional communications configuration wherein opposing
2 direction training signals are simultaneously transmitted via a bi-directional
3 communications channel, a method of improving receiver performance comprising:

4 substantially limiting, based on prior connection information, a subset of tones
5 transmitted as part of one of the training signals to those of the tones
6 likely to be employed for same direction data transmission.

1 16. A method as in claim 15, further comprising:
2 storing an encoding of employed tones for use in a subsequent performance of
3 the tone subset limiting.

1 17. A method as in claim 15,
2 wherein the tones likely to be employed are calculated as a function of one or
3 more encodings of tones previously employed for data transmission via
4 the bi-directional communications channel.

1 18. A method as in claim 15,
2 wherein the limited subset of tones likely to be employed for same direction
3 data transmission is a function of tones employed in one or more of the
4 prior connections.

1 19. A method as in claim 15,
2 wherein the limited subset of tones likely to be employed for same direction
3 data transmission is a function of both tones and bit allocations
4 employed in one or more of the prior connections.

1 20. A method as in claim 15,
2 wherein the bi-directional communications channel is organized a plural
3 subchannels thereof.

1 21. A method as in claim 15,
2 wherein the tone subset limiting is performed using a design function to
3 accommodate changing impairments of the bi-directional
4 communications channel.

1 22. A method of operating a digital subscriber line transceiver unit, the
2 method comprising:

3 selecting a subset of less than all available tones for inclusion in a training
 4 signal, the selection based on stored prior connection information; and
 5 during a portion of a training interval, transmitting the training signal via a
 6 digital subscriber loop, the training signal consisting essentially of the
 7 subset of tones, such that simultaneous reception by the transceiver
 8 unit during the portion of the training interval is substantially
 9 unaffected by local echo contributions of tones unlikely to be
 10 employed during data transmission.

1 23. A method as in claim 22, further comprising:
 2 storing an encoding of tones employed during data transmission for use in
 3 subsequent performance of the subset selection.

1 24. A method as in claim 22,
 2 wherein the stored prior connection information includes encodings of tone
 3 sets employed in plural prior data transmissions via the digital
 4 subscriber loop.

1 25. A method as in claim 22,
 2 wherein the subset selection is performed based on tone sets employed in
 3 plural prior connections via the digital subscriber loop.

1 26. A method as in claim 22,
 2 wherein the subset selection is performed based on tone sets employed and bit
 3 allocation results for at least one prior connection via the digital
 4 subscriber loop.

1 27. A method as in claim 22,
 2 wherein the subset selection is performed using a design function to
 3 accommodate changing impairments of the digital subscriber loop.

1 28. A communications device comprising:
 2 a transceiver unit adapted for simultaneously receiving a signal and
 3 transmitting a training signal via a communications channel;

4 a training signal generator coupled to the transceiver unit and selective for a
5 subset of less than all signal elements for inclusion in the training
6 signal based on stored prior connection information.

1 29. A communications device as in claim 28,
2 a data store coupled to the training signal generator to supply the stored prior
3 connection information.

1 30. A communications device as in claim 28,
2 wherein the signal elements include tones in accordance with a discrete
3 multitone (DMT) modulation scheme.

1 31. A communications device as in claim 28, embodied as a digital subscriber
2 line transceiver.

1 32. A communications device as in claim 31, wherein the digital subscriber
2 line transceiver is one of:
3 a central office end transceiver; and
4 a remote terminal end transceiver.

1 33. A method as in claim 1,
2 wherein the communications channel includes a digital subscriber loop.

1 34. A communications device as in claim 28,
2 wherein the subset selection by the training signal generator is performed as a
3 function of plural sets of the stored prior connection information.

1 35. A communications device as in claim 28,
2 wherein the subset selection by the training signal generator is performed
3 using a gain function to accommodate changing impairments of the
4 communications channel.

1 36. A communications device as in claim 28,
2 wherein the received signal includes a received training signal.

1 37. A digital subscriber line transceiver unit comprising:
 2 a prior connection information store; and
 3 a training signal generator coupled to the prior connection information store
 4 and selective for a subset of less than all available tones for inclusion
 5 in a training signal based on prior connection information stored
 6 therein,
 7 wherein, when transmitted by the digital subscriber line transceiver unit, the
 8 training signal consists essentially of the subset of tones, such that
 9 simultaneous reception by the digital subscriber line transceiver unit is
 10 substantially unaffected by local echo contributions of tones unlikely
 11 to be employed during data transmission.

1 38. A digital subscriber line transceiver unit as in claim 37,
 2 wherein the stored prior connection information includes encodings of tone
 3 sets employed in plural prior data transmissions.

1 39. A digital subscriber line transceiver unit as in claim 37,
 2 wherein the subset selection is performed based on tone sets employed in
 3 plural prior connections.

1 40. A digital subscriber line transceiver unit as in claim 37,
 2 wherein the subset selection is performed based on tone sets employed and bit
 3 allocation results for at least one prior connection.

1 41. A digital subscriber line transceiver unit as in claim 37,
 2 wherein the subset selection is performed using a gain function to
 3 accommodate changing impairments of a digital subscriber loop.

1 42. A digital subscriber line transceiver unit comprising:
 2 a prior connection information store; and
 3 a training signal generator coupled to the prior connection information store
 4 and selective for a subset of less than all available tones for inclusion

5 in a training signal based on prior connection information stored
6 therein,
7 wherein, when transmitted by the digital subscriber line transceiver unit over a
8 first communication channel, the training signal consists essentially of
9 the subset of tones, such that a second communication channel is
10 substantially unaffected by crosstalk from tones unlikely to be
11 employed during data transmission.

1 43. A digital subscriber line transceiver unit as in claim 42, wherein the first
2 and second communication channels are conveyed over respective proximate wire
3 pairs.

1 44. A computer program product encoded in at least one computer readable
2 medium and comprising,
3 a first functional sequence executable to select a subset of less than all
4 available tones for inclusion in a training signal, the selection based on
5 stored prior connection information,
6 wherein, when transmitted by a transceiver unit via a communication channel,
7 the training signal consists essentially of the subset of tones, such that
8 simultaneous reception by the transceiver unit during a training
9 interval is substantially unaffected by local echo contributions of tones
10 unlikely to be employed during data transmission.

1 45. A computer program product as in claim 44, further comprising:
2 a second functional sequence executable to store an encoding of tones
3 employed during data transmission for use in subsequent execution of
4 the first functional sequence.

1 46. A computer program product as in claim 44,
2 wherein the at least one computer readable medium is selected from the set of
3 a disk, tape or other magnetic, optical, or electronic storage medium
4 and a network, wireline, wireless or other communications medium.

1 47. An apparatus comprising:

2 a transceiver; and
3 means for selecting, based on prior connection information, a subset of signal
4 elements for inclusion in a training transmission.

1 48. An apparatus as in claim 47, further comprising:
2 means for storing the prior connection information.